

SCIENCE

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COAST SURVEY PARTIES IN ALASKA.

THE United States Coast and Geodetic Survey Office has received a telegram from their sub-office in San Francisco, Cal., giving the information that an agent of the Alaska Commercial Company had arrived by the last steamer from St. Paul, Alaska, bringing mail from the Coast and Geodetic Survey parties who have been engaged in making explorations and surveys on and near the 141st meridian of longitude (the boundary between Alaska and the British possessions). These two parties were commanded by Messrs. J. E. McGrath and J. H. Turner, assistants of the Coast and Geodetic Survey. The party under Mr. McGrath ascended the Yukon River to the boundary-line, and there made its headquarters, while that headed by Mr. Turner went up the Porcupine River to the Rampart House (the Hudson Bay Company's trading-post in the vicinity of the boundary), and there camped for the further prosecution of their work. Both parties were at their posts early in the autumn of 1889; and with the provisions which they carried with them, and those which were to be forwarded by the Alaska Commercial Company's steamer, they would have been provided with an ample quantity for fully fifteen months: but the loss of the steamer "Arctic" in 1889, and with it a portion of the provisions on which they relied, did not leave much margin for "high living" in Mr. McGrath's party; but, as he states, "we might have had to test the virtue of a very spare diet only for two unexpected resources that turned up. The first was a great crop of turnips that Mr. McQuesten, agent of the Alaska Commercial Company, raised at the store on Forty-Mile Creek during the summer: it was the first time he had made a garden there. The second was a greater number of deer crossing the trails they have between the Tan'a-nah' and the Yukon Rivers (these trails intersect the valley of Forty-Mile Creek) than was ever before known by white men, and a corresponding abundance of fresh meat."

Mr. McGrath's party, however, remained at their post, and accomplished all the work which a very stormy, although not as cold as had been expected, season permitted.

The records made comprise a set of magnetic and of meteorological observations for a year; a set of specimens of sediments obtained from filtering certain measured quantities of the water of the Yukon River, made at regular intervals; certain botanical specimens; and a series of photographs. Mr. McGrath also gathered considerable information from some of the most intelligent of the Indians which he encountered at Forty-Mile Trading-Post, and had them make for him lists of all the Indians from Fort Yukon to Big Lake on the White River, and from the Tan'a-nah' to the tributaries of the Porcupine. These were drawn up in tallies, and arranged according to families. These he turned over

to Mr. Greenfield (one of Mr. Petroff's deputies); and, as some of the tribes had not been reached by Mr. Greenfield, it was of much service to him in making the census enumeration.

Owing to the stormy weather, Mr. McGrath was unable to obtain a sufficient number of astronomical observations to justify him in returning this fall; and his party will therefore remain until next spring, and then descend the river, doing what work they can in the cause of science on their way down.

Mr. Turner's party were much more favored by the weather than the other party. They completed the necessary astronomical observations for the determination of the geographical position of their station on the Porcupine River at the boundary-line, also a set of magnetic and meteorological observations, and made a topographic map (on a scale of 1:5000) of the river in the vicinity of their camp, and a survey (on a scale of 1:200000) from the boundary to Fort Yukon, a distance of about one hundred miles.

A small scheme of triangulation was undertaken to locate three monuments placed to mark the boundary-line. An exploring expedition was sent during the months of March and April to explore the line northward to the Arctic Ocean. The party visited Herschel Island. During May another trip was made about forty miles to the southward; as far as Salmon Trout River.

Mr. Turner reports that the Hudson Bay Company have this summer moved their quarters to a site within the British domain.

Mr. Turner reached St. Michael's Aug. 30, 1890, with his party, too late to catch the steamer coming south. The party will winter there, and in the spring carry the triangulation toward the mouth of the Yukon River, until relieved by orders from the Coast and Geodetic Survey Office.

Both gentlemen speak in their reports of the uniform and untiring zeal which has been displayed by the officers and men in their parties; and, from this standpoint, it seems as if the subordinates have only tried to emulate their chiefs.

THE LATEST RESULTS OF ORIENTAL ARCHÆ- OLOGY.¹

A YEAR ago (*Science*, Dec. 13, 1889) I gave a short account of the startling archæological discoveries which had just been made in Arabia. The explorations of Doughty, Euting, Huber, and, above all, Glaser, the inscriptions they had found, and the historical facts disclosed by the decipherment of the epigraphic material, have thrown a sudden and unexpected flood of light on a continent which has hitherto been darker even than Central Africa. The members of the last Oriental Congress heard with astonishment that a country

¹ Fr. m. The Contemporary Review.

which had been supposed to be little more than a waste of sand and rock, inhabited by wandering nomads, and first appearing on the page of history in the time of Mohammed, had really been a centre of light and culture in remote ages, — a land of active trade and commerce, which once exercised an important influence on the civilized world of the ancient East, and possessed an alphabetic system of writing earlier, it would seem, than that which we know as the Phœnician alphabet.

I was able to give only a brief outline of the results that had been announced by scholars in the new field of research. A large portion of the inscriptions on which they were based had not been published, and the work promised by Dr. Glaser, on the ancient geography of Arabia, had not appeared.¹ Moreover, there had not yet been time for the special students of Arabian history and epigraphy to criticise the conclusions at which scholars like Professor D. H. Müller or Dr. Glaser had arrived.²

A year has passed, and we have now had time to take a sober review of the new discoveries, and examine their weak points. In one respect the history of ancient Arabia which I laid before the readers of the *Contemporary Review* must be modified. Professor D. H. Müller was too hasty in ascribing an early date to the inscriptions of Lihhyân in northern Arabia. Instead of belonging to the tenth, or even the seventh, century before our era, it is now evident that they are not earlier than the fall of the Roman Empire. They are strongly influenced by the religious ideas and technical terms of Judaism, and belong to the period when Jewish colonies and Jewish proselytism were rapidly extending through Arabia. The kingdom of Lihhyân rose and decayed at no long interval of time before the birth of Mohammed.

On the other hand, further study has gone to confirm Dr. Glaser's view of the great antiquity of the Minæan kingdom, and of the spread of its power from the south of Arabia to the frontiers of Egypt and Palestine. There can be no doubt that it preceded the rise of the kingdom of Saba, the Sheba of the Old Testament. There was no room for the contemporaneous existence of the two monarchies. Geographically they covered the same area; and the cities of Saba were embedded, as it were, within the territory of Ma'in. But the Sabæan cities flourished at the expense of those of Ma'in, and later tradition forgot even the names of the old Minæan towns.

The kingdom of Saba was already flourishing when Tiglath-Pileser and Sargon ruled over Assyria, in the eighth century B.C. And not only was it flourishing: its power had extended far to the north, where the Assyrian monarchs came into contact with its king. The visit of the Queen of Sheba to Solomon carries back the foundation of the Sabæan monarchy to a still earlier date. Unless we are to suppose that the visit is the invention of a later writer, we must conclude that nearly ten centuries before the Christian era Saba had already superseded Ma'in; and that the old kingdom, with its trade and culture, its fortified cities and inscribed walls, had already passed away. The fact would explain why it is that classical writers know only of a Minæan people, not of a Minæan kingdom; and that even in the pages of the Old Testament, while references occur to Sheba, only a careful search can detect the name of Ma'in.

¹ Dr. Glaser's large and learned volume on the ancient geography of Arabia has now been published (*Skizze der Geschichte und Geographie Arabiens*, vol. II., Berlin, Weidmann), and contains a wealth of information on subjects like the site of Ophir, or the geographical knowledge of Ptolemy.

² *Skizze der Geschichte Arabiens*, Part I. (Munich, Straub).

Dr. Glaser has shown that the "kings" of Saba were preceded by the Makârib, or "high priests" of Saba. Here, as in other parts of the Semitic world, the priest-king was the predecessor of the merely secular king. The State was originally regarded as a theocracy, and it was some time before the priest and the king became separated from one another. We are reminded of the history of Israel, as well as of Jethro, the "priest of Midian." As in Assyria, where there were "high priests of Assur" before there were "kings of Assyria," the State was represented by a deity whose name it bore, or who derived his name from the State. Saba, like Assur, must once have been a god.

We are already acquainted with the names of thirty-three Minæan sovereigns. Three of them have been found by Professor Müller in inscriptions from the neighborhood of Teima, the Tema of the Old Testament, in northern Arabia, on the road to Damascus and Sinai. Their authority, therefore, was not confined to the original seat of Minæan power in the south, but was felt throughout the length of the Arabian peninsula. The fact is confirmed by an interesting inscription copied by Halévy in southern Arabia, which has been deciphered by Professor Hommel and Dr. Glaser. It tells us that it was engraved by its authors in gratitude for their rescue by Athtar and other deities "from the war which took place between the ruler of the land of the south and the ruler of the land of the north," as well as "from the midst of Egypt (*Mitsr*) in the conflict which took place between Madhi and Egypt," and for their safe restoration to their own city of Qarnu. The authors of the inscription, Ammi-tsadiq and Sa'd, further state that they lived under the Minæan king, Abi-yada' Yathi', and that they were "the two governors of Tsar and Ashur and the farther bank of the river."

Professor Hommel has pointed out that in Ashur we have an explanation of the Asshurim of the Bible, who are called the sons of Dedan (Gen. xxv. 3, 18); while Tsar must be a fortress often mentioned on the Egyptian monuments as guarding the approach to Egypt, on what would now be the Arabian side of the Suez Canal. Madhi Dr. Glaser would identify with Mizzah the grandson of Esau (Gen. xxxvi. 17), but the other references in the inscription are obscure. It proves, however, that the power of the Minæan princes was acknowledged as far as the borders of Egypt, in what Professor Hommel believes to have been the age of the Hyksos. That their authority was recognized in Edom is shown by an inscription in which mention is made of Gaza.

It would thus appear that Palestine, or at all events the tribes immediately surrounding it, were in close contact with a civilized power which had established trade-routes from the south, and protected them from the attacks of the nomad Bedouin. The part now performed, or supposed to be performed, by Turkey, was performed before the days of Solomon by the princes and merchants of Ma'in. A conclusion of unexpected interest follows this discovery. The Minæans were a literary people: they used an alphabetic system of writing, and set up their inscriptions, not only in their southern homes, but also in their colonies in the north. If their records really mount back to the age now claimed for them, — and it is difficult to see where counter-arguments are to come from, — they will be far older than the oldest known inscription in Phœnician letters. Instead of deriving the Minæan alphabet from the Phœnician, we must derive the Phœnician alphabet from the Minæan, or from one of the Arabian alphabets of which the Minæan was the mother; in-

stead of seeking in Phœnicia the primitive home of the alphabets of our modern world, we shall have to look for it in Arabia. Canon Isaac Taylor, in his "History of the Alphabet," had already found himself compelled by palæographic evidence to assign a much earlier date to the alphabet of South Arabia than that which had previously been ascribed to it, and the discoveries of Glaser and Hommel show that he was right.

As soon as we reverse the problem, and assume that the Phœnician alphabet is later instead of earlier than the Minæan, we obtain an explanation of much that has hitherto been puzzling. The names given to many of the Phœnician letters are at last found to agree with the forms of the latter. It is only in the South Arabian alphabets, for instance, that the letter called *pē* ("the mouth"), our *P*, has the form of a mouth, or that the first letter, *aleph* ("an ox"), really resembles the head of that animal. Moreover, we can now understand how it is that the South Arabian alphabets possess letters which do not occur in the Phœnician alphabet, and are not derived from any of the Phœnician characters. The Phœnician language had lost certain sounds which comparative philology has shown belonged to the Semitic parent-speech, and which were preserved in the languages of Arabia. That these sounds should have been represented by special symbols in the Arabian alphabets, if the latter had been borrowed from the defective alphabet of Phœnicia, is unintelligible: in such a case the symbols would have been modifications of other symbols already existing in the alphabet, or else the same symbol would have been allowed to express more than one sound. This has actually happened in Hebrew, where the same symbols stand respectively for *'ain* and *ghain*, for *s* and *sh*. There can be but one explanation of the fact that the Arabian alphabets denote by independent symbols certain sounds which had been lost in Phœnician pronunciation. The Arabian alphabets are more primitive than the alphabet of Phœnicia. When the latter first comes before us, it is in a comparatively late and conventionalized form, widely removed from the hieratic characters of Egypt, out of which it is commonly supposed to have been developed.

The discovery of the antiquity of writing among the populations of Arabia cannot fail to influence the views that have been current of late years in regard to the earlier history of the Old Testament. We have hitherto taken it for granted that the tribes to whom the Israelites were related were illiterate nomads, and that in Midian or Edom the invaders of Palestine would have had no opportunity of making acquaintance with books and written records. Before the time of Samuel and David it has been strenuously maintained that letters were unknown in Israel; but such assumptions must now be considerably modified. The ancient Oriental world, even in northern Arabia, was a far more literary one than we have been accustomed to imagine; and as for Canaan, the country in which the Israelites settled, fought, and intermarried, we now have evidence that education was carried in it to a surprisingly high point. In the principal cities of Palestine an active literary correspondence was not only carried on, but was maintained by means of a foreign language and an extremely complicated script. There must have been plenty of schools and teachers, as well as of pupils and books.

The latest revelation that has been furnished to us by the tablets of Tel-el-Amarna relates to Jerusalem. Among the tablets now in the Museum of Berlin, five have been found which prove, upon examination, to have been letters sent from the King or Governor of Jerusalem to the Egyptian

sovereigns in the century before the exodus. The governor in question was named Abdi-dhaba, or Ebed-tob as his name would have been written in Hebrew. He describes himself as occupying a more independent position than the governors of most of the other towns of Palestine. They were merely Egyptian officials. He, on the other hand, though he owned allegiance to the Egyptian monarch, nevertheless claims to have derived his power from "the oracle of the mighty king." As one of the letters shows that this "mighty king" was not the king of Egypt, but a deity, we are irresistibly reminded of Melchizedek, the king of Salem, and priest of "the most high God," from whom, therefore, the king derived his authority. Last spring I had already recognized the name of "Urusalim," or "Jerusalem," in one of the Tel-el-Amarna tablets at Cairo, and one of those which I copied in the collection of M. Bouriant tells us what was the local name of the "most high God." The tablet is unfortunately broken; but on one side of it we read, "The city of the mountain of Jerusalem, the city of the temple of the god Uras, (whose) name (there is) Marru, the city of the king which adjoins (?) the locality of the men of Keilah." Marru seems to be the same word as the Aramaic *marē* ("lord"). He was identified with the Babylonian Uras, and his temple stood on "the mountain" which was called Moriah, perhaps in remembrance of the god. Long before the days when Solomon built the temple of Yahveh the spot on which it stood had been the site of a hallowed sanctuary.

The tablets at Berlin refer to transactions which had taken place between Abdi-dhaba and the "Kassi" or Babylonians; and in one of them an oracle of the god of Jerusalem is quoted which declared, that, "so long as a ship crosses the sea,—this (is) the oracle of the mighty king,—so long shall the conquests continue of Nahrma and the Babylonians." Since Nahrma is the Aram-Naharaim of the Old Testament, light is thrown on the account which is given us in the Book of Judges of the eight-years' occupation of southern Palestine by the king of that country. In Chushan-rishathaim we must see a successor of the princes whose conquests were proclaimed by the oracle on Moriah. It was an anticipation of the career which Balaam predicted for "the Star of Jacob."

Light is also thrown on a statement of the Egyptian historian Manetho, which it has been the fashion to treat with scant respect. He tells us that when the Hyksos were expelled from Egypt they built Jerusalem as a defence; not against the Egyptians, as would naturally be expected, but against "the Assyrians." In the age of Manetho, "Assyrians" and "Babylonians" were synonymous terms.

But though it is to the tablets of Tel-el-Amarna that we must look for light upon the history of the Canaan which the tribes of Israel invaded, it is rather from the monumental records of ancient Arabia that we may expect to draw our chiefest illustrations of the inner life and belief of the invading tribes themselves. One of these illustrations has already been indicated by Professor Hommel.¹ In one of the Arabian inscriptions discovered by Euting we find the word *lau'dn* used in the sense of "priests." The word is etymologically the same as the Hebrew *Levi*; and when we remember that Jethro, the priest of Midian, watched, as it were, over the birth of the Israelitish priesthood, and had as his son-in-law the Levite Moses, there opens out for us, as Professor Hommel remarks, "a new and unexpected perspective in the history of religion."

A. H. SAYCE.

¹ Aufsätze und Abhandlungen zur Kunde der Sprachen, Literaturen und der Geschichte des vorderen Orients, Munich.

VASSAR STUDENTS' AID SOCIETY.

THE first annual meeting of the Vassar Students' Aid Society was held at Sherry's, Fifth Avenue and 37th Street, New York, on Saturday, Oct. 25, 1890.

The meeting was called to order by the president, Mrs. J. R. Kendrick, who emphasized in a brief address the relation between the work of this society and the general movement of the day toward the wider extension of the higher education, and spoke of the enduring nature of its task.

The secretary reported that the society now numbers 17 life-members and 374 annual members, including residents of Mexico, Germany, South America, and India. Many encouraging letters were received from former students, expressing sympathy with the objects of the society, and no little pleasure in being allowed to claim a place among the daughters of Vassar and in the opportunity for acknowledging their indebtedness for the benefits received at her hands. The work of securing new addresses has been continued through the generosity of a member who gave printed lists covering the years from 1865 to 1869. A non-graduate who received a copy of one of these wrote forty letters, and obtained information in regard to seventeen former students, — an incident which illustrates not only the amount of work involved in this search, but also the general willingness to help, which has made possible the measure of success the society has achieved.

In March the state of the treasury warranted the announcement of a scholarship, to be awarded in June, 1890. As the society represented widely separated sections of the country, it was deemed fairest to all to open as widely the competition for the scholarship. The late announcement prevented the majority of the applicants from adapting their preparation to the college requirements, and but two passed the examination unconditionally. Both are now in college, the second as the recipient of aid from the college.

The treasurer reported a total of \$751.98 received since October, 1889, — from 17 life-members \$425, from annual members \$326.98; cash paid for scholarship, \$200; for printing, postage, and sundries, \$117.93; and a balance in treasury, including life-membership fees, of \$434.05.

The organization of a Minnesota branch at St. Paul, Nov. 22, 1889, has been followed by the formation of branches in Boston, New York, Brooklyn, Poughkeepsie, Orange (N.J.), and Louisville (Ky.), and the appointment of committees in other centres. These branches reported the details of their organization, their plans for extending their influence by the admission of associate members and by giving series of lectures, and made announcement of local scholarships as follows: —

The Boston branch, to residents of localities represented by the branch, a scholarship of \$200 for competition in June, 1891. Application must be made to Mrs. Frank H. Monks, Monmouth Street, Brookline, Mass.

Brooklyn branch, to residents of Long Island, a scholarship of \$100, tenable four years, to be awarded in June, 1891. Application should be made to Mrs. Charles O. Gates, 100 Greene Avenue, Brooklyn.

Kentucky branch, to residents of the State, a scholarship, probably of \$400, for competition in June, 1891; application to be made to Mrs. Patty B. Semple, 1222 Fourth Avenue, Louisville.

The New York and Poughkeepsie branches anticipate being soon able to announce one each for award in June.

The parent society also offers two scholarships, of \$200 each, for general competition in June, 1891 and 1892 respectively. Application must be made to Miss Jessie F. Smith, South Weymouth, Mass.

Application for these scholarships must be made before May 10.

The balloting to fill the vacancies caused by the expiration of terms of office resulted in the election of Professor Abby Leach, Mrs. George H. Mackay, Professor Mary W. Whitney, and Miss Rachel Jacobs.

Invitations to the public meeting had been sent to about five hundred friends of education and of Vassar. Dr. Mary Taylor Bissell presided. In a stimulating address, Dr. Taylor dwelt upon the advantages of the principle of co operation in the bestowal of

aid to students, and pointed out the importance of extending assistance to those who were willing to prove their capacity by entering a competitive examination, and who showed their desire to be self-reliant in their willingness to accept these scholarships in the form of a loan.

THE PRESERVATION OF TIMBER.

IN countries where timber is cheap, labor expensive, and money scarce, it does not pay to apply preservative substances to wood to delay or prevent its natural decay. A very rapid calculation will show that wages, cost of chemicals, and compound interest together, represent a sum greater than the cost of frequent renewals. However, the wastefulness of settlers in new countries, and the steady accumulation of capital in the old ones, are rapidly doing away with this condition of affairs. Timber is growing both scarce and dear, while increased means of communication have reduced wages in places formerly on the outskirts of civilization. Even in this country, where timber was once so plentiful that care was not even exercised to cut it at a period of the year when it was at least filled with sap, and when "seasoning" was never thought of in the hurry of railway construction, considerable attention is now being given to preservative processes. Unfortunately the desire to carry them out cheaply has often brought them into discredit. Homœopathic quantities of antiseptics have been not unfrequently used, the action being confined to the outside of the timber, and being quickly dissipated by the action of air and moisture.

Engineering of Nov. 21 gives a history of attempts at prolonging the life of timber, from which we take the following: —

In 1836, Dr. Bouchorie, a French chemist, tried to impregnate timber by vital suction; that is he tapped the tree, and allowed the ascending sap to carry up a preserving solution. This, however, did not give satisfactory results, and in place of it a cap was supplied to the end of a newly cut log, and the solution forced along the sap ducts by hydraulic pressure. Sulphate of copper was the chemical used; and, when it was applied to newly felled timber, it gave good results. Lime water has been tried, and also salt, but the effects have not repaid the trouble. There is a strip of road in the Union Pacific Railroad, in Wyoming Territory, where the sleepers do not decay at all. The analysis of the soil shows that it contains sodium, potassium chloride, calcium, and iron, which act as preserving agents. An inventor named Foreman brought out a process by which dry arsenic and corrosive sublimate were inserted in holes in sleepers, and covered with plugs. The materials became dissolved, and effloresced on the surface, when the cattle licked them and died by scores. The farmers rose in arms and forced the railroad company to burn all the sleepers. Many other attempts might be narrated; indeed, the entire list of antiseptic substances appear to have been ransacked to find something both cheap and effective.

The chief processes that have been employed for the preservation of timber are kyanizing, burnettizing, and creosoting; that is, impregnation with bichloride of mercury, with sulphate of zinc, and with creosote. Many others have been proposed and tried, but only these three have survived. The first seems to be well adapted for bridges, or for timber exposed to weather alone, and not to constant moisture. Examples have been found in this country which were in a good state of preservation after twenty eight years' exposure; but, when kyanized timber has been used for railway sleepers and pavements, it has had only a doubtful success, probably in consequence of the washing-out of the corrosive sublimate. The wood is allowed to steep one day for each inch in thickness of its least dimension, and one or two days in addition. The solution contains 1 per cent by weight of corrosive sublimate and from four to five pounds of this are absorbed per thousand feet, board measure. Burnettizing may be performed in the same way, sulphate of zinc being the chemical employed; but it is usual to steam the timber first to open the pores, and then to subject it to a vacuum to withdraw the sap. If this be not done, the timber must be stored for a considerable time to allow it to dry naturally. When treated, the wood should not be placed in exposed situations, such as bridges, or else the zinc will be washed out and leave it unprotected. This is partic-

ularly true when weak solutions are used; and when the potency is greatly increased, the tenacity of the timber is impaired. In Germany 1.91 per cent is considered the proper strength for railway-sleepers. Several suggestions have been made to confine the zinc in the timber. Mr. W. Thelmany proposed to subject the timber to a subsequent bath of chloride of barium, with the view of producing an insoluble sulphate of baryta. It is doubtful, however, if the re-action would go on in the minute sap-ducts of the wood. Another process is that of Mr. Wellhouse, who also employs a double solution, the first being chloride of zinc to which a little glue is added, and the second a solution of tannin. It is claimed that the latter, upon coming in contact with the glue, forms small particles or films of artificial leather, which plug up the mouth of the sap ducts, and prevent the zinc being washed out. Certain experiments which have been made seem to confirm the idea. Another plan consists in using a solution of chloride of zinc and gypsum. The gypsum crystallizes and hardens inside the sap-ducts, and forms partitions to hold the zinc within the cells. There are three burnettizing works in the United States; and the cost of the process is about five dollars per thousand feet board measure, or from twenty to twenty-five cents a sleeper.

Creosoting is so well understood that it scarcely needs description. It is in almost universal use for sleepers for English railways, and no other process has been commercially proved capable of resisting the *Teredo navalis* and *Limnoria tenebrans*. In England and Holland from ten to twelve pounds of creosote-oil per cubic foot of timber are found sufficient for harbor purposes; the French use nineteen pounds for the same purpose; and a similar quantity has been found necessary in the Gulf of Mexico, where the marine worms cut off an unprepared pile in eight months. The creosoting process needs to be well done to be effective, and for ordinary purposes from eight to twelve pounds are required per cubic foot of timber.

It was generally considered that the presence of heavy oils in the creosote was objectionable, and therefore engineers were accustomed to specify that not more than 10 per cent should be present. This view has been controverted by others, who take the view that it is only the heavy oil which can be relied upon to exert a continuous preservative action, the creosote itself being liable to become dissipated in course of time. This view receives confirmation by the good results of the preservative process introduced by Mr. Henry Aitken of Falkirk. This consists simply in soaking timber in melted naphthaline for a period varying from two to twelve hours, depending on the bulk of the piece. A temperature of 180° to 200° F. is all that is required for the process, and is most easily obtained by placing steam-pipes in the bottom of the tank which contains the material. Simple as the process is, that is not its chief merit. A more valuable feature is that it can be applied to green timber, thus doing away with the long and expensive process of seasoning. The naphthaline makes its way through the pores of the wood, decomposing the albuminoid compounds, and displacing both sap and water. It then becomes fixed, and the whole substance is permeated with solid antiseptic of a permanent character.

Aitken's process was introduced in 1882, and three years afterwards an account was given in *Engineering* (July 3, 1885) of certain trials that had been made to demonstrate its utility. Among these were mentioned the construction of some railway-wagons for the North British Railway. These were made from logs taken direct from the timber-pond and naphthalized. The logs were cut up and worked in the usual way; for, unlike creosoting, the Aitken process does not render timber more difficult to cut, neither does it interfere with painting or varnishing. The wagons have, up to the present, shown no signs of decay, and all the joints are tight. When taken apart the tenons still show the chisel marks, demonstrating that they have not been working in the mortises. On the same railway there were placed sleepers and keys, and after seven years these are still perfectly fresh. One of these keys is in perfect condition, and does not appear to have been touched since it was first driven. Four years ago fencing-slabs of poor Swedish timber, some already beginning to decay, were naphthalized and put down, and to-day they are in as good a condition as ever.

In coal-pits equally good results have been obtained; and larch timbering, which usually becomes quite rotten in five years, has remained perfectly sound. White ants and the *Teredo* do not find naphthaline more palatable than creosote, for samples laid in the harbor of Colombo have been carefully avoided by both pests.

In England there are only two methods of preserving timber in general use; namely, careful seasoning and creosoting. The latter is only applicable to rough work, such as sleepers, fencing-posts, and the like; while the former is expensive, and is only moderately successful in the case of soft timber. It remains to be seen if the Aitken process will take rank with the others and obtain general acceptance. It is full of promise, and, if it fulfils only a part of what appears to have been proved for it experimentally, will be a valuable addition to the means of fighting the deteriorating influences of time and weather. For many purposes hard woods are employed simply on account of their great durability; the cheap, soft woods being, in other respects, equally well suited. If the soft woods can have their lives prolonged, a great saving can be effected in most cases. The sudden seasoning said to be effected by naphthaline, without sensibly hardening the wood or rendering it difficult to work, deserves to be carefully investigated, as it would liberate an immense amount of capital now lying idle, besides preventing the annoyance resulting from the use of half-seasoned timber. Every thing that offers to cheapen production is worth trying in these times of fierce international competition.

THE FORESTS OF ANNAM.

THE forests of Annam have recently, says the French *Moniteur Officiel des Commerce*, been explored by one of the officials of the Forests Department, who was instructed by the French Government to examine and report upon them, particularly with reference to their extent and the possibility of their practical utilization. The first information obtained upon the subject relates to the forests of Nghê-An, in the province of Vinh. These forests, says the *Journal of the Society of Arts* (London), quoting from the above-named periodical, are situated in the mountains and at some considerable distance from the coast, covering almost the whole of the district watered by the Song Ca River, commencing at Luong, and its principal tributary the Song-Cong. The lower vegetation covering the soil, and the almost impenetrable network of tropical climbers which reach up to the higher branches of the trees, render it extremely difficult to penetrate far into the heart of the forests.

The woods met with in the forests of Nghê-An are very varied and numerous; but the most important, and those in which considerable trade is carried on, are the *go-liem*, or iron wood, and the *govan-tam*. The other descriptions of wood, although often more valuable, are much rarer, and therefore less frequently met with on the various markets. The *go-liem*, or iron wood, is hard but brittle, of a brownish-red color, and would last a very long time were it not for the injuries inflicted upon it by white ants, which attack and speedily destroy it. In spite of this, it is eagerly sought after, and is of great utility, being employed in the construction of columns for pagodas and houses, piles for bridges and platforms, furniture, coffins, junks, etc. Its weight is about 1,100 kilograms the cubic metre. It takes a good polish, and hardens in course of time. It is brought to market in logs of from five to eight metres in length, and sometimes, but less frequently, from ten to twelve metres in length. The *go-liem* is largely exported. The *govan-tam* is a yellowish-white wood, with a very fine grain. It is easily worked, is very light, and polishes well. It is used for the common kind of furniture, mouldings, boxes, and ordinary coffins, the hulls of junks and sampans, oars, etc. Its most frequent use is in ship-building.

Beyond these two descriptions, which, from a commercial point of view, are the most important, there are a number of other woods little used by the Annamites, either on account of their scarcity, or because they are considered to be little capable of being worked up. They are, however, says M. Thomé, well deserving of some attention, by reason of the fact that Europeans might find a use for this excellent raw material which the Asiatics appear incapable of doing.

The principal of these woods are the following. The *sangle* is a yellowish-brown wood, which gets darker with time. It is a rare and very dear wood, not decaying under water, very heavy, and susceptible of a good polish. It is frequently employed in the construction of the better class of junks, and is sold in the markets in logs sawn through the middle. This is done because the purchaser, paying a high price for this particular description of wood, insists upon seeing the condition of it throughout. This wood has no sap, and it frequently attains a height of 18 metres. The *yé* is a rose-colored wood, scented, and capable of a good polish. It is light, and is not attacked by ants. There are two varieties of this wood,—the *yé-bai*, or white; and the *ye van*, or yellow. The *ven* is a dark-yellow wood, becoming brown with age. It is light, and is fit for ordinary carpenters' work. The *gavi* is a yellowish-white wood, heavy, and with long fibres. It is sold in planks from 12 to 15 metres long, and is used for framework and in the construction of junks. The *tio* is a red, hard, and heavy wood, with a coarse grain; and the *tine* is a purple-colored wood, tender, and with very fine grain. The latter, says M. Thomé, might well be used for cabinet-making. The *gô* is a red colored wood, and the tree attains a height of from 10 to 13 metres. It is useful in carpenters' and cabinet-makers' work. The *bop* is a white wood, extremely light (very much resembling cork), polishes well, and would be useful to joiners. The *meucque* is a light, white wood, used for making *sabots* for the Annamites. The *goo* is a very fine, light, and well-veined wood, becoming black with age, scarce in Nghê-An, but abundant in Ha-tinh. It is used for inlaying work. The oak, thus named because it resembles the European oak, is a heavy wood of mahogany color, has a good polish, and is used in cabinet-work.

Among the other principal woods in which a considerable trade is carried on, may be mentioned the bamboo, rattans, *cunao*, *vang sao* (a parasite plant used in Chinese medicine, and very expensive), and cinnamon. From the clearings to the banks of the river, the logs and planks of wood are dragged by buffaloes. Rafts are then formed, which descend the stream from Nghê-An and Ha-tinh in all seasons except when the waters are exceptionally swollen. During the dry season the streams have always a sufficient amount of water to allow the rafts to go down to the sea. The province of Nghê is one of the richest in Annam from a forest point of view; and the Song-Ca and Song-Cong, streams which traverse the forest region, form excellent means of transport for articles so heavy and cumbersome as timber.

GEM-MINING IN SIAM.

THE region in which gems, including rubies and sapphires, have for the past ten years been found, lies situated on the western side of the Cambodian peninsula, about 240 miles south-east of Bangkok, and covers approximately an area of 100 square miles. The centre of that district is Chantabun, a seaport with a good harbor, connected with Bangkok by a line of three small steamers running at regular intervals. It is stated in a recent report to the foreign office that within three hours' walk from Bangkok, to the north-west, is Ban Kacha, where rubies of a very inferior kind are still sought after by the local inhabitants, both Siamese and Chinese. Tongsoos, or natives of Pegu, and Burmese, do not work there. Again, twelve hours distant from Chantabun are the mines of Müang Krung, with a mining population of about 100 in all, mostly Tongsoos, with a few native Siamese and Chinese. Two days' journey from Chantabun, in a southerly direction, is the district of Krat, with mines from which rubies are extracted, and but few sapphires. The Tongsoo workers there number about 3,000. On the eastern side of the hill range, and three days' journey due east from Chantabun, midway between that town and Battambang, are the Phailin mines, the most extensive and most frequented of all. Here there are between 4,000 and 5,000 gem-seekers. Rubies and sapphires are both found, the latter being more abundant. The rubies at these diggings, although more rarely met with, are said to be of higher value than those discovered at other places in Siam. A stream which rises in the hill ranges passes through the neighborhood of the mines on its way to the Thale Sap and the Cambodia River. All three of these

localities—Krat, and Phailin—have been, or shortly will be, conceded on mining leases.

The method of obtaining the precious stones, as described in the *Journal of the Society of Arts*, London, is identical at all the diggings in the region of Bangkok, and is as follows: The intending digger, on entering the district, pays three ticals (5s. 3d.) to the head man,—a Burmese British subject appointed by the British Legation, and responsible to the governors of Battambang and Chantabun, according as the fees received are derived from the Phailin or Krat mines. Beyond this tax there is no further fee exacted. The Siamese Government claim no right to pre-empt gems found, or to purchase at market value all stones above a certain carat weight, as was the case in Burmah. The Tongsoo digger's first object is to discover a layer of soft, yellowish sand, in which both rubies and sapphires are deposited. This stratum lies at depths varying from a few inches to twenty feet on a bed of subsoil, on which no precious stones are found. A pit is dug until this corundum is exhausted; and the soil removed is then taken to a neighboring canal or stream, one of which runs in the proximity of the mines both at Phailin and Krat, where it is mixed with water, and passed through an ordinary hand-sieve. In his search for this peculiar alluvial deposit, which is generally free from any admixture of clayey earth, the digger has often to penetrate into the jungle that grows thickly around, combining the work of clearing with the occupation of gem-digging.

The Tongsoos do not appear to form themselves into companies for mutual assistance or division of profits. They work principally in twos and threes; and, if chance lead them to discover a gem of any value, they either undertake a sea-voyage to Rangoon or Calcutta for the purpose of obtaining a good price for it themselves with the dealers in precious stones at these places, or consign their acquisitions to an agent, while they themselves continue to search for more. A process of migration is continually going on among the Tongsoos of the different mines, the workers passing from one to the other, according to the reputation of a particular mine at certain periods.

No artificial or mechanical processes for the washing of the soil have as yet been introduced, nor have gems been discovered in fissure veins of soft material embedded in crevices of hard rock or in crystal form. Rubies and sapphires are found at all the diggings, often deposited side by side in the same layer or stratum of sand. The ruby of "pigeons' blood" color is rarely, if ever, met with. The color of the Siam ruby is usually light red of a dull hue. The sapphire is of a dark, dull blue, without any of the silken gloss which is the distinctive mark of the Burmah and Ceylon stone. Stones resembling garnets rather than rubies are found in the dried beds of water courses at Raheng, two hundred miles north of Bangkok; and there is every reason to believe that rubies also equal, if not superior, to those discovered in the south-east, exist throughout the Raheng district. Those hitherto obtained are the result merely of surface scratchings by the Tongsoo seekers.

NOTES AND NEWS.

THE encouragement received in New York since April 1 by George L. English & Co., mineralogists, has been such as to lead them to the decision to concentrate their entire business in the metropolis. It is their purpose, therefore, to transfer their Philadelphia stock to New York on Jan. 1, 1891. For the present they will remain at 739 and 741 Broadway, where, with new fixtures, a greatly enlarged stock, and an increased corps of assistants, they hope to merit and receive a growing patronage.

—The production of kirschwasser in Switzerland is carried on in the cantons that produce the best cherries; namely, Basle-Campagne, Bern, Aargau, Freyburg, Grisons, St. Gall, Lucerne, Upper Unterwalden, Soleure, Schwytz, Valais, Vaud, Zug, and Zurich; that is to say, in fourteen cantons out of twenty-two. The United States consul at Lucerne says that the principal distilleries are in the following cantons: Basle, Lucerne, Schwytz, and Zug. The others are small concerns, consisting of one, two, or at most three, stills. The manufacture of kirschwasser is also carried on to a great extent by the farmers. For the distillation of kirschwasser,

both black and red cherries are used; but the former are preferable, as producing a spirit of finer quality, and in greater quantity. According to the *Journal of the Society of Arts* (London), there are no special methods of cultivation, the cherry-trees being generally in the same orchards with apple and pear trees; but, as this is the first fruit on which the farmers can realize money, they naturally pay great attention to their cherry-trees. The process of manufacture is as follows: The cherries are first carefully cleansed, great importance being attached to this point; the stems are then removed, and the fruit packed in very thick wooden casks, and left to ferment for a period of from five to eight weeks, according to the weather; after which it is ready for distillation. In large distilleries the stills contain from 220 to 264 gallons, while in the smaller ones the quantity varies from these figures to 11 gallons. The large distilleries, with one or two exceptions, make use of indirect steam as a means of heating, the stills being constructed with double bottoms, through which steam passes. The others employ naked fires, the fuel consisting of peat or the refuse of cherries and pears after distillation, which is compressed into bricks, and dried. Both methods of heating have numerous advocates, who each claim the superiority of their system. Kirschwasser is placed on the market in litre (1.76 pints) bottles, in carboys containing from 10 to 60 litres, and in casks. The wholesale market value of kirschwasser varies very much, according to good or bad crops, and consequently according to the price of fruit in good seasons; the price of new pure kirschwasser being sometimes as low as two francs per litre, while in bad seasons it is sometimes as high as four francs, the average being about three francs. All distilleries, it is said, even the best with one exception, adulterate their kirschwasser by the addition of cheap spirit of wine or spirit of potatoes (which is imported from Germany), according to the price offered by the buyer, the cheaper qualities consisting of about three parts of spirit to one part of kirschwasser. All distillers guarantee the purity if the full market price is paid. It is impossible to state with any accuracy what is the annual production. Different statements put down the average at from 300,000 to 500,000 quintals (a quintal is equal to 1.9 hundredweight). The principal markets for kirschwasser are North America, South America, and British India. France also imports a considerable proportion of the kirschwasser of Switzerland.

—Mr. William Hamilton Gilson, the well-known artist and illustrator, has accepted charge of the illustration class of the New York Institute for Artist Artisans.

—The efforts which have been made to open commercial communication between England and the heart of Siberia by way of the Arctic Seas have at last been successful, according to *Nature* of Nov. 27. A correspondent of the *London Times*, who signs himself, "One who knows all about it," explains the circumstances connected with this remarkable triumph of skill and energy. Two ships and a tug for river-work were despatched from London at the end of July and beginning of August. Owing to north-easterly winds, the Kara Sea was exceptionally full of ice, so that the ships were detained for some days among ice-floes. Nevertheless, in thirty-nine days the ships and tug reached Karaoul, 160 miles up the Yenisei, without accident. They remained there nineteen days, and took twenty-six days to return. They were thus only eighty-four days, or two months and twenty-three days, away from the London Docks. At Karaoul they met the river expedition, which "returned safe to Yeniseisk a few days ago, and is now landing and warehousing there the valuable cargo sent out from England." The same correspondent points out that the real *cruz* of the expedition lay in the 160 miles of estuary between Golcheka, at the mouth of the Yenisei, and Karaoul, at the head of the estuary, which the Russian Government had assigned as the port of discharge. Last year the "Labrador" would not ascend to Karaoul, because Capt. Wiggins thought there would not be water enough to take him there, and had no steam-launch to enable him to feel his way up. On the other hand, the river-ship did not dare to descend on account of the gales that then prevailed. This year it was discovered that through the entire estuary there was a channel with sufficient

water for ships of any draught, and the ships proceeded up the river to their destination without hindrance. It is unfortunate that Capt. Wiggins was accidentally prevented from completing the work with which his name has been so intimately associated; but it was he who showed the way, and to him, more than to any one, belongs the honor of having provided this new outlet for British commerce. That it may become an outlet of the highest importance is the conviction of no less an authority than Baron Nordenskiöld. In a letter congratulating the promoters of the undertaking, he says, "I am persuaded that its success will once be regarded as an event rivalling in importance the return to Portugal of the first fleet loaded with merchandise from India. Siberia surpasses the North American continent as to the extent of cultivable soil. The Siberian forests are the largest in the world. Its mineral resources are immense; its climate, excepting the *tundra* and the northernmost forest region, healthy, and as favorable for culture of cereals as any part of Europe." He goes so far as to say that the future of Siberia may be "comparable to the stupendous development which we at present see in the New World."

—The many instances of strange doings by excited men are matched by an incident said to have occurred recently in England during a run with the hounds of Sir Watkin Williams Wynn. In passing a cottage the fox suddenly found himself among a lot of fowls. Absolutely regardless of possible consequences, he snatched up one of the birds, and carried it in his mouth to the end of the run, and was killed with it in his mouth. This is given for what it is worth.

—A discovery which may lead to important results has been made by M. Chabré during the course of his experiments upon the properties of the recently isolated gaseous fluorine substitution products of marsh-gas, as we learn from *Nature* of Nov. 27. The intimate relation between these bodies and chloroform, and the possibility of their possessing even greater physiological activity, led M. Chabré to investigate the action of one of them, methylene fluoride (CH_2F_2), upon specific microbes, with the result, that, in the case of the particular bacillus experimented upon, the gas is found to absolutely destroy them. The bacteria in question, which have formed the subject of these first experiments, were those discovered by M. Bouchard, in 1879, in urine. Two eprouvettes of equal size were taken and filled with mercury over a mercury-trough. Equal small quantities of urine containing colonies of the bacteria were introduced into each, and afterwards a mixture of air and methylene fluoride admitted into one of the eprouvettes, and an equal volume of air alone into the other. The two vessels were both maintained at the temperature of the body, 35° , for twenty-four hours. At the end of this time a few drops of the urine from each of the vessels were introduced into separate flasks containing sterilized culture medium, and both maintained at the same stove temperature for twenty-four hours, and again for forty-eight hours. At the expiration of this period the urine which had stood in contact with air alone was found to have given rise to a flourishing colony of the bacteria, while that which had been in contact with the mixture of air and methylene fluoride had not given rise to a trace of a culture. According to MM. Albarran and Hallé, twelve hours are ample for the development of this bacillus, hence methylene fluoride had evidently been fatal to the germs. The experiment was again repeated without the use of mercury, in sealed tubes, but with the same result. It appears, therefore, that methylene fluoride possesses the property of destroying the urinary bacteria in question. M. Chabré has made special experiments in order to determine whether the gas possesses any local irritant action; and the results, as far as they go, appear to be eminently satisfactory. He is now directing his experiments upon the microbe of the hour, that of tuberculosis, and his results will doubtless be watched with considerable interest. Methylene fluoride is easily prepared by heating silver fluoride with methylene chloride in a sealed tube. M. Chabré has also succeeded in preparing the higher homologue, $\text{C}_2\text{H}_4\text{F}_2$ (ethylene fluoride), by the analogous re-action with ethylene chloride, and is extending his observations to the antiseptic properties of this latter gas.

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

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THE BOTANICAL MYTHOLOGY OF THE HINDOOS.

AT a recent meeting of the Anthropological Society of Bombay, as we learn from *Nature* of Nov. 13, Dr. Dymoke read a very interesting paper entitled "The Flowers of the Hindoo Poets," in the course of which he referred to the mythical conceptions which have gathered round trees and plants in the minds of the Hindoos. The ancient Eastern poets saw in the tree a similitude with the heavens and with the human form. In the "Gitagovinda" a comparison is drawn between the clouds and the thick dark foliage of the *Tamala*. These fancies gave rise to the numerous poetical myths concerning the tree of life, of knowledge, of the *Amrita* or ambrosia, as well as those concerning cosmogonic and anthropogonic trees. The *Soma* or *Amrita* is represented as the king of plants, the eternal essence which constantly sustains and renews the life of plants and animals. It is the symbolical drinking of this eternal essence as a holy ceremony to which constant allusion is made in the Vedas:—

"We've quaffed the Soma bright,
And are immortal grown;
We've entered into light,
And all the gods have known."

Rig Veda, viii.

The *Amrita* appears in various forms in stories and legends. A famous poet says that the drop (*Svedavindu*) which fell into the

shell became a pearl; in the mouth of the black snake it became poison; and in the flower of the plantain, nectar. Several plants bear this name, and are supposed to be endued with an extra particle of the eternal essence, among others the *Neem*, on which account the Hindoos, on their New Year's Day, eat the leaves of this tree upon the supposition that the *Amrita* contained in them will insure longevity. In Hindoo flower-lore the large black bee (*Buramara*) plays an important part: he is the inconstant lover who delights in gathering sweets from every flower. The queen of Indian flowers is the lotus. The Hindoos compare the newly created world to a lotus-flower floating upon the waters, and it thus becomes symbolical of spontaneous generation. The golden lotus of Brahminic and Buddhistic mythology is the sun, which floats in the waters which are above the firmament, like an earthly lotus in the deep blue stream below. From it distils the *Amrita*, the first manifestation of Vishnu. Brahma and Buddha (the supreme intelligence) were born of this heavenly lotus. Lakshmi, the Indian Venus, is represented sitting on this flower. The Hindoos see in the form of the lotus the mysterious symbol *Svastika*. The allusions to this flower by Indian poets are innumerable. No praise is too extravagant for it. It is the chaste flower, and its various synonyms are bestowed as names upon women. The red lotus is said by the poets to be dyed with the blood of Siva, that flowed from the wound made by the arrow of Kama, the Indian cupid. The face of a beautiful woman is compared by the poets to a lotus-blossom, the eyes to lotus-buds, and the arms to its filaments. The bee is represented as enamored of the lotus. Although a humble little flower, the *Tulasi* is almost as great a favorite as the lotus. It is addressed to the goddess Sri or Venus. The heart of Vishnu is said to tremble with rage if a branch of his beloved is injured. The plant must be gathered only for medicinal or religious purposes, such as the worship of Vishnu or Krishna, or the wife of Siva. It is a kind of *Amrita*, symbolical of the eternal essence. It protects the worshippers, and gives children to women. The plant is often worshipped as a domestic deity, and its branches are placed on the breasts of the dead. The *Champa* is chiefly celebrated for its overpoweringly sweet odor and golden color. So strong is its perfume that the poets affirm that bees will not extract honey from it; but they console it for this neglect by dedicating it to Krishna, who loves garlands of yellow flowers as becoming to his dark complexion. One of the greatest favorites of the poets is the *Asoka*. Its flowers, which are yellow when they first open, gradually change to red. In March and April it is in its glory, and at night perfumes the air with its delicate odor. The tree is the *kul*, or anthropogonic tree of the Vaisya caste, who call it *Asupala*. The kadamba (*Anthrocephalus cadamba*) is sacred to Kali or Parvati, the consort of Siva. It has many synonymes, such as "protecting children," "dear to agriculturists," etc. Its blossoms at the end of the hot season, and its night-scented flowers form a globular orange-colored head, from which the white-clubbed stigmas project. The flowers are fabled to impregnate with their honey the water which collects in holes in the trunk of the tree. In Delhi the goldsmiths are fond of imitating the flowers. The well-known prickly gold beads so often seen in Delhi jewelry are meant for kadamba-flowers. In this part of India the Marathas will not gather the flowers for profane purposes, as it is their anthropogonic tree. The Kadamba Rajas claim their descent from it, as recorded in the following legend: "After the destruction of the demon Tripura, a drop of perspiration fell from the head of Isvara into the hollow of a kadamba-tree, and assumed the form of a man with three eyes and four arms. He became the founder of Vanavasi or Jayantipur." There are other versions of the story, but all agree in connecting the origin of the family with this tree, a branch of which is necessary to represent the Kai at a Marathi marriage ceremony.

HEALTH MATTERS.

Adventure of an Hypnotic Subject.

THE *Lancet* of Aug. 2, 1890, contains the following: In Rome the other day, in that church of the Ara Coeli where Gibbon, as he himself tells us, conceived his "History of the Decline and

Fall" of the empire, a young man of foreign appearance, about five in the evening, was seen to be making the round of the several chapels. Suddenly he stopped before the altar of St. Francis of Assisi, and remained in rapt attention before the picture of the saint. More than an hour elapsed, and he was still seen standing, perfectly motionless, his eyes fixed on the well-known painting. At last the *custode*, as it was time to close the church, told him that he must withdraw. The stranger seemed not to hear, and moved neither a foot nor a muscle, still gazing as if in ecstasy at the picture. The *custode* shook him, and urged him to go, but in vain, till at length the Municipal Guard were called in, and the young man was lifted bodily from the pavement, and taken first to the station-house, and then to the Ospedale della Consolazione. The guard had tried to bring him to consciousness by dashing water in his face and shaking him; but, finding these measures ineffectual,—the man remaining with his eyes fixed on some invisible object above, and not a muscle of his body stirring,—they brought him to the medical waiting-room of the Consolazione. There the physicians immediately pronounced the case to be one of hypnotism, and, after various remedies had been tried without success, they at last succeeded in bringing him to consciousness by hypodermic injections of ether. On coming to himself, the patient turned out to be a Bavarian; and one of the attachés of the German Embassy, who had been summoned, identified him as a young, recently graduated physician of Munich, who had been subject to hypnotic fits for some time past. Thanking all the officials—medical, municipal, and diplomatic—for the care and kindness he had experienced at their hands, he returned to his hotel. The Roman press, commenting on the occurrence, remarks that two or three centuries ago the same phenomenon would have been regarded as treasure-trove by the church, and the chapel of St. Francis of Assisi, in the Ara Coeli, would have attracted crowds of pilgrims eager to come under the direct influence of the saint. Medical science, however, may now say, "Nous avons changé tout cela."

The Protection from Diphtheria and Tetanus by Inoculation.

The Berlin correspondent of the *Medical Record* has cabled to that journal under date of Dec. 4 that he has received advanced proofs of an article on the prevention of diphtheria and tetanus in animals, based upon experiments in the Hygienic Institute at Berlin, made by Dr. Behring, assistant in the institute, and Dr. Katasato of Tokio. He states that after long experimentation, these observers claim to have cured animals suffering from either of these diseases—diphtheria and tetanus—by the inoculation of the serum from the blood of animals already infected. It is claimed by a large number of experiments, first, that the blood of rabbits protected from tetanus possesses the property of destroying the tetanus poison; second, that this property is possessed by the non-cellular serum obtained from the blood; third, that this property is of so constant a nature that it also remains active in the organism of other animals, so that notable therapeutic effects are produced by the transfusion of blood or serum; fourth, that the property of destroying the tetanus virus is absent in the blood of those animals which are not protected against tetanus, and, if the tetanus virus is injected into non-protected animals, it can be so demonstrated, even after the death of the animals, in the blood and in the other fluids of the body.

The Curability of Galloping Consumption.

The announcement by so well-known a physician as Dr. McCall Anderson that acute phthisis, or galloping consumption, is curable, excites a good deal of surprise and quite as much incredulity; yet the *Medical Record* states that Dr. Anderson reports seven cases of this character, of which five recovered.

Cancer Mortality among the Jews.

An English paper (quoted by the *Medical Record*) states that one of the lecturers at Owens College, Manchester, has put forward the assertions (1) "that no Jew or Jewess has ever been known to suffer from cancer;" and (2) that "the immunity of the Hebrew race from this frightful scourge was attributed to their abstinence from swine's flesh."

The Micro-Organisms of Standing Water.

Drs. Scala and Alessi, according to *La Rivista Internazionale d'Igiene* for August, have completed a series of experiments demonstrating that micro-organisms multiply in standing water at the expense of the organic matter liberated in the water, this multiplication being but slightly influenced by a temperature a little above zero. They note the fact that micro-organisms diminish in water charged with carbonic acid. After demonstrating that light, movement, pressure, and cold have no influence on these micro-organisms, they experimented directly with carbonic acid, their experiments resulting in the proof of the lethal action of carbonic acid on the micro-organisms of water. This action they consider analogous to that by which other ferments die in liquids produced by themselves.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Right-Handedness.

ANENT the articles in *Science* upon right-handedness and effort, by Professors James and Baldwin, it may not be amiss to call attention to the anatomical and physiological conditions that offer at least one explanation of right-handedness in most persons.

That one cerebral hemisphere stands in dominant relation with the opposite side of the body is so well known that it is only mentioned as a reminder; but it may not be generally known that the left cerebral hemisphere is larger than the right, its inner face (at the great longitudinal fissure) coming very near to the middle-line, while the corresponding inner edge of the right hemisphere is well to the right of the median line. The existence, then, of greater nutrition and greater functioning ability in the left hemisphere might well be assumed. But that there is a reason for the greater size, development, etc., of the left hemisphere, is evidenced by a study of the conditions of blood-supply to the two hemispheres. The left carotid artery ascends almost perpendicularly so as to form, as it were, an elongation of the ascending aorta, while the right carotid is given off from the *arteria innominata*. The right vertebral artery is given off by the subclavian after the latter has described its arch and become horizontal, but the left vertebral arises from the apex of the subclavian's curve. There is thus the distinct advantage to the left hemisphere of a better blood-supply because of the much straighter course taken by the great channels carrying it. On the other hand, this greater directness of communication between the heart and left hemisphere explains the greater readiness with which the latter is subjected to certain forms of disease. A clot of fibrine whipped off a diseased valve is carried much more readily because of the direct route (*via* the carotid) to the left hemisphere; and in conditions of degenerative weakness of the arteries in general, those of the left hemisphere, being subjected to greater pressure in their distal ramifications, will be more apt to yield than corresponding ones in the right.

In passing, it may be mentioned that the location in the left hemisphere of the centres connected with the faculty of language is explainable on the ground of better development of that hemisphere. An admirable lecture on this subject by Professor Gerhardt appeared in *Berliner klinische Wochenschrift*, No. 18, 1887.

Concerning the different periods at which different motor activities become manifested in the human infant, it is well to remember that the voluntary motor tract is not completely developed in the human being until after the end of the first year (Flechsigs), and that the fibres developing from the occipital cortex only begin to appear between the second and third months of extra-uterine life. Up to the latter period, motor activities following visual stimulation must be considered as reflex; but the use of the right hand predominantly, or at a later period from conscious choice, is a conse-

quence of the pre-existing better nutrition, and hence readier functional activity, of the left cerebral hemisphere.

JOSEPH T. O'CONNOR, M.D.

51 West 47th Street, New York, Dec. 3.

Onondaga Folk-Lore.

UNTIL recently David Cusick's "History of the Six Nations" was the chief treasury of Iroquois legends, though much could be gathered from the writings of early missionaries and travellers. These, however, paid more attention to customs of life. Of late more care has been given to the collection of stories, and with fair results, but many old tales have been forgotten. Even so prominent a legend as that of Hiawatha was unknown to the whites fifty years ago, but it may not be very old among the Indians themselves. As a frequent visitor to the New York Onondaga Reservation, I have occasionally obtained some material of this kind, part of which has been published, and can only regret not doing this earlier.

The Onondagas have a strong belief in witches, and take precautions against them. A clear-headed and intelligent Indian told me that he met a spirit one night, and described its appearance. He took a good look at it, not being afraid, for, being a Christian, he was sure no spirit could hurt him. Supposed witches are avoided or placated, but are not now punished, though once they were put to death. I have been in an unfathomed cave on the east side of the reservation, where, it is said, a witch was cut to pieces, and thrown into the rocky cleft, many years ago.

Pygmies are supposed to live under ground, sometimes appearing to men, and their old abode was pointed out to me. They are the Che-kah-ha-wha, or Small People, of the Onondagas; the Yah-ko nen us-yoks, or Stone Throwers, of the Mohawks; and the Ehn-kwa-si-yea, or No Men at All, of the Tuscaroras.

The tale of the vampire, which caused a change in the mode of burial, was first published by David Cusick. The version given me differs somewhat from this and that of Mrs. Erminnie A. Smith. Leaving out the graphic details for another time, the story may be briefly told. A man and his wife, with their father, one night occupied a deserted cabin. As the fire went down, a skeleton form appeared, killed the old man, and began gnawing his body. This aroused the younger persons, and the skeleton retreated when they stirred up the fire. By stratagem they escaped one at a time, but were soon pursued. Their friends came to meet them when they heard their cries, and they were rescued. The people assembled, found a skeleton in a bark coffin in the house, resolved to burn it; and out of the flames came a red fox, which burst through their ranks, and disappeared in the forest.

The story of O-kwen-cha, or Red Paint, deals with the marvels of magic, in which the boy proved powerful. He saved his grandmother by overcoming the great wrestler, and brought an uncle to life. By destroying a giant he restored another uncle; and by overcoming a wonderful dog, a third. The fourth uncle was delivered by a longer and curious trial, and he returned home with them, to find his grandmother grown old. By an odd expedient he restored her young looks, twisting a stick in the loose skin of the back of the neck, until all the wrinkles were drawn out of her face. I found a resemblance, in one part of this tale, to a Canadian legend related by Mr Chamberlain. Red Paint arranged the scattered bones, and then pushed against a tree, crying, "Look out, look out! this tree will fall upon you!" The bones united, jumped up, and ran away. In the Canadian story the boy shoots an arrow in the air, with a similar exclamation and result.

It is unlucky to shoot at the white sea-gull, the bird of the clouds, or the one that never lights on the ground, for it dives in the air, and the hunter misses his aim. If he does this twelve times, on the thirteenth he will vomit all the blood from his body. This is the bird which destroyed Hiawatha's daughter, and not the white heron.

The Great Mosquito was an immense creature, and did much harm. One story relates that the Onondagas and Cayugas destroyed him, but with much loss to themselves. Clark ascribes the victory to Hiawatha, but the usual hero is the Holder of the Heavens. On the Tuscarora Reservation, near Lewiston, the stone

is shown on which he rested, and the tracks of pursuer and pursued were preserved near Syracuse, N.Y., until quite recently. The bird-like prints of the monster's feet were described to me, and the place of his death yet retains its early name. All the stories agree in making the small mosquitoes originate in the decaying body.

The Onondagas raise the old tobacco (*N. rustica*), and it is used for sacred purposes, though not restricted to them. When medicinal plants are sought, a little tobacco is strewn around the first one found, and it is left for good luck. A little bag of tobacco is attached to the wooden false face, when this is left long unused, and this still remains on the one I have. Tobacco was always burned with the white dog.

The False Faces form a society, somewhat like medicine-men, and are supposed to have magic powers. The old masks are of wood, and these are like those described one hundred and fifty years ago. Green Pond, a little west of Jamesville, is one of the reputed early resorts of the False Faces, their magic powers opening the rocky walls. They still have feasts of their own, and assist at others.

I have been often asked whether the curious silver brooches have any significance as emblems or charms. None at present, certainly. Originally made by white men, their manufacture at last passed into Indian hands, and they were used simply as ornaments. All my crosses had been worn by Pagans. I have many forms of these brooches, but they are becoming rare. They are circular, square, lyre-shaped, diamond-shaped, stars, single or double armed crosses, Masonic emblems, combinations of hearts and crowns, etc. Some persons have attached much mystery to these double-armed crosses, as though they were antique and rare. I have had a number from Onondaga Indians, who recently used them. Among many silver ornaments and brooches, I have had and seen but one brass brooch.

There are some wampum stories, and much that is curious in its use. The Iroquois had no true wampum until the Dutch came, but may have used colored sticks or quills. An Onondaga tale makes Hiawatha's wampum of eagle-quills, and ascribes the invention to him. He alone could call down the wampum bird.

Some of the old feasts and games are yet retained. Both Seneca and Onondaga snow-snakes are made, and much used; a boy often holding several in his hand, and throwing them one after another. The boys also use the javelin a great deal; and another favorite game with children is mumble-the-peg. Their name for violets signifies "heads entangled," the flowers being interlocked and pulled apart. Lacrosse has almost disappeared, base-ball taking its place. Among implements and ornaments I still find early forms; but they are fast being displaced, and some which I used to see cannot now be found at all. W. N. BEAUCHAMP.

Baldwinsville, N.Y., Dec. 3.

Osteological Notes.

CONSPICUOUS by its prominence, occupying the lateral regions of the mammalian cranium, and connecting these with the face by an osseous bridge, is the series of bones known as the jugal or zygomatic arch. As this arch presents many modifications in the various orders, for the full understanding of its morphology it will be necessary to trace out its correlations not only with the neighboring structures, but also with the habits and environment of the animal. Composed often of three bones,—the malar or jugal in the centre, flanked on either side by the zygomatic process of the squamosal and by the malar process of the maxilla,—the arch may be reduced to two, the process of the squamosal and the jugal, or the process of the squamosal and the post-orbital process of the frontal. The number of bones present depends upon the advanced or receding position occupied by the orbit, also upon the position held by the articulation of the mandible in relation to the orbital cavity, whether this be above, below, or on a level with it. Although the arch in certain cases is very imperfect, it can never be said to be entirely absent. The strength of the jugal arch, the most important factor in its existence, depends upon its line of direction, whether this be straight or curve!, and upon the amount and manner of this curvature; upon the number,

size, extent of surface, and mode of union, of its component bones. These, in their turn, are correlated with the articulation of the lower jaw, and with the amount of surface presented by the ascending ramus; with the neighboring fossæ, crests, and processes; with the dental series; and necessarily with the muscles concerned in mastication, varied as they are in their action.

The jugal arch, as it exists in the order of the *Carnivora*, offers perhaps the most instructive example of the various points to be considered in its morphology. Take the cranium of the tiger as a type of the cats (*Felidae*). In this, the arch, composed of three bones,—the squamosal, malar, and maxilla,—presents an extraordinary, horizontal curvature, thereby vastly increasing its expanse, giving great width to the temporal fossa, and consequently allowing a corresponding development of the temporal muscle, which, taking its origin from the largely expanded surface of the parietal, and from the occipito-sagittal crest, passes forwards and downwards, to be inserted into the high, wide, oblique, coronoid process of the mandible.

The increase in length of the arch, due to the great horizontal curvature, is also seconded by the advanced position of the orbit upon the skull, and to its height above the level of the articulation of the mandible.

The vertical curvature of the arch, with the convexity above and the concavity below, denotes increased power of resistance to the strain produced by the muscular fibres of the masseter, which, springing from the under side of the arch, are carried obliquely backward and downward to be inserted into the deeply grooved ascending ramus. The action of the pterygoids, which is similar to that of the masseter, is also relatively powerful. The fibres rising from the pterygoid fossæ and plates are inserted into the inside of the angular portion of the lower jaw, and into the neck of the condyle. The suture by which the jugal process of the squamosal and the malar are joined extends very obliquely through a greater portion of the arch; this obliquity imparting much strength to the bony structure, and giving force to assist the pressure upward.

The convex surface of the transverse condyle of the mandible, received into the deeply grooved glenoid cavity, forms the hinge-like articulation fitted for the vertical action of the jaw, and which is necessary for the prehension, tearing, and division of the flesh by means of the characteristic incisors, canines, and molars.

In the order of the *Edentata*, the cranium of the great ant-eater (*Myrmecophagus jubata*) exhibits a jugal arch which is the extreme opposite of that which has been thus partially described. In the ant-eater the arch is very incomplete, consisting of a short styloid process given off by a very rudimentary jugal, and of an extremely small, tuberos, zygomatic process from the squamosal, no union being formed between the two. There is no post-orbital process of the frontal, and indeed no separation between the orbital and temporal fossæ. Under these circumstances, the muscular development concerned in the preparation of the food is very feeble, correlated as it is with the entire absence of teeth, and any necessity for mastication.

Between these two extreme modifications there are many intermediate forms of the jugal arch. In some of the *Rodentia*, although the arch is relatively weak, as shown by the downward convexity in its vertical curvature, the masseter has other points of fixed insertion, by which means the masticatory powers are fully sustained. Moreover, the antero-posterior form of condyle is received into an undefined fossa situated upon the side of the cranial wall, whereby a corresponding amount of dental energy is imparted, suited to the habits of the rodent. Cope and Ryder have attributed the peculiarities of the dental system in this order to the mechanical consequences of an increase in the length of the incisors, which increase is due to their continued use. By a similar process of reasoning it may be shown that the imperfect condition of the arch in some of the other orders is correlated with an entire absence of the teeth, with a feeble muscular energy, and a loss of mastication, all being the result of continuous disuse.

In short, it may be said in general that the great development of the arch is dependent upon modifications which are strictly due to use, while its weakened and imperfect condition is equally the result of modifications which are due to disuse.

There seems as yet no evidence afforded by paleontological research to show that the jugal arch has undergone any special changes since the days of the *Creodonta*, the ancestors of the cats. We may therefore conclude that the phylogenesis of the *Carnivora*, at least, remains essentially the same, so far as this portion of the skull is concerned.

D. D. SLADE.

Cambridge, Mass., Dec. 5.

BOOK-REVIEWS.

A Revision of the South American Nematognathi or Cat-Fishes.

By CARL H. EIGENMANN, Ph.D., and ROSA SMITH EIGENMANN.

San Francisco, Cal. Acad. Sci. 8°. \$3.

THIS extensive work will be highly welcomed by ichthyologists. It is based on several thousand specimens from the Museum of Comparative Zoölogy at Cambridge, Mass. The material was collected chiefly during the Thayer Expedition. Besides that, numerous other collections were studied; for instance, that of Senhor Honorario, made in Goyaz, that made by his Majesty Dom Pedro II in Rio Grande do Sul, and that made in Lake Titicaca by Professor Alexander Agassiz and Mr. S. Garman.

In all, 101 genera and 467 species are enumerated. Full descriptions of most of the species in the Museum of Comparative Zoölogy are given. The synonymy is treated in full, and the bibliography is given at the end of the volume. In this we should like to add Dr. C. B. Bruhl's "Osteologisches aus dem Pariser Pflanzengarten" (Wien, 1856), containing descriptions and figures of the osteology of *Aspredo*, *Loricaria*, and *Hypostoma*.

Besides the index of species and genera, a geographical index is added, and a map with especial reference to the localities where collections have been made. Both will be of great help to the student.

The different forms are referred to eight families, seven of which are confined to tropical America. The relationship of families and subfamilies is expressed by a phylogenetic diagram.

The nearly cosmopolitan family *Siluridae* (it is only absent in Australia) reaches its greatest development in South America, where it is represented by six subfamilies. The *Bunocephalidae* are found in the whole course of the Amazon and in Guiana. The *Diplomystidae* are represented by a single genus and species from Chili, the *Diplomystes papillosus*, Cuv. The family *Hypophthalmidae*, with the genera *Hypophthalmus* and *Helogenes*, is confined to the northern Amazon and Guiana. The *Pygididae* contain eleven genera, and are found in mountain-streams of Chili and the Argentine Republic. The *Argiidae*, the anatomy of which needs further study, have only three genera. They are characteristic of the Andes of Peru, Ecuador, and Colombia. The *Loricariidae*, with twenty-four genera, occur east from the Argentine Republic to Central America, west in Ecuador and Colombia. The seven genera of the *Callichthyidae* extend from La Plata to Rio Orinoco, and in the Amazon as far as Nauta.

The authors may be congratulated on this work, which will be of the greatest value to the student of fishes. Thanks are due to the California Academy of Sciences for publishing this work. It forms Volume I. of a new series of publications, called "Occasional Papers of the California Academy of Sciences."

AMONG THE PUBLISHERS.

"FROM Babel to Comparative Philology" is the title of a chapter in Dr. Andrew D. White's "Warfare of Science," which will open the January *Popular Science Monthly*. It gives the origin of the legend in regard to the great tower and the confusion of tongues, and also traces the early history of the belief that Hebrew was the only language spoken by God and men before Babel was undertaken. The second article in the great series on "The Development of American Industries since Columbus" will also appear in that number. The special topic is "Iron Mills and Puddling-Furnaces," being a part of the general subject of iron and steel, which is being treated by Mr. William F. Durfee. Like the opening paper, it is copiously illustrated, and much more readable than the title would indicate. Professor Huxley has attacked the idea that the people who spoke Aryan were one distinct race. His discussion of this point will be printed in the *Popular*

Science Monthly for January and February, under the title "The Aryan Question and Prehistoric Man." The storage of electricity will be explained in a fully illustrated article by Professor Samuel Sheldon of the Brooklyn Polytechnic Institute, in the January number.

—The president of the Royal Geographical Society declared in 1889 that "the most salient event of the year has been the daring journey of Fridtjof Nansen and his little party of Norwegians and Lapps across the inland ice of Greenland." Dr. Nansen's fully illustrated account of his adventures and of his extraordinary success will be published shortly, both in London and New York, by the Longmans.

—The action of Congress in setting apart a reservation of California forest land considerably larger in extent than the State of Rhode Island furnishes a theme for the leading editorial in *Garden and Forest* for Dec. 3. Some of the other subjects discussed are "House Gardening in Cities;" "The Trees of Kansas;" "A Fatal Disease of the Cranberry;" notes on orchids, ferns, wild-flowers, and chrysanthemums; and seasonable counsel for all interested in trees and shrubs. The principal illustration is of a vase of chrysanthemums, which is an object-lesson in the decorative value of these favorite flowers.

—The American Academy of Political and Social Science at Philadelphia is doing a valuable work in publishing material of value to students of economics and politics. It is making a specialty just now of the railroad problem. The July number of its proceedings contained an account of the reform in railway passenger tariffs recently introduced into Hungary. The January number will contain an account of the system just introduced into Austria. The work of the academy is all the more valuable on account of its strictly scientific character. The organization takes no sides, but contents itself with an objective presentation of the facts relating to the subject.

—Among the matter which has recently appeared in the *American Naturalist*, and which is in preparation, the following titles may be mentioned: "The Evolution of Mind from a Neo-Lamarckian Standpoint," by Professor E. D. Cope; "The Effects of the Electric Current on Kemmler's Body," by Dr. E. C. Spitzka; "On the Languages and Lore of the Zuñi Pueblos," by Dr. J. W. Fewkes of Harvard University; "On a Family of Hermaphrodites," by Dr. Luce; "The Wild Buffalo of Mindoro," by Professor J. B. Steere; "The Physiological Effects of Special Feeding on Bees," by Professor A. J. Cooke of Michigan State Agricultural College; and "The Metamorphic Forms of the American Newt," by Professor Simon Gage of Cornell University.

—Messrs. Ticknor & Co. have secured the exclusive sale for America, and will publish, by arrangement with Mr. B. T. Batsford, the London publisher, a limited edition of "Architecture of the Renaissance in England," by J. Alfred Gotch and W. Talbot Brown. The first part will appear immediately, and the others at intervals of two or three months.

—Last week's number of *The Illustrated American* is styled the "Naval Number," because sixteen pages are dedicated to naval matters. "Where We build our War-Vessels" is a description of the New York Navy Yard, illustrated; and "Our Battle-Ships" describes and illustrates the new battle-ship designed for the Bureau of Construction at Washington, and the most formidable war-ships of the foreign powers. A portrait of Admiral David D. Porter serves as the frontispiece. The wonders of the Nile are continued in an illustrated article describing hundred-gated Thebes.

—Lieut. Willoughby Walke, instructor in charge of the United States Artillery School laboratory, has made a series of experiments with the object of determining the strength of various newly invented or patented explosives. The composition of these new explosives, says *Engineering*, differs much; but they have all one feature in common, viz., that their inventors all claim that

Publications received at Editor's Office,
Nov. 24-Dec. 5.

- BAKER, D. W. History of the Harvard College Observatory during the Period 1840-1890. Cambridge, Harvard University. 32 p. 8°.
- BALDWIN, J. Harper's Sixth Reader. New York, Harper. 504 p. 12°. 90 cents.
- BRACKETT, C. F., and others. Electricity in Daily Life. New York, Scribner. 288 p. 8°.
- CAJORI, F. The Teaching and History of Mathematics in the United States. Washington, Government. 400 p. 8°.
- CENTURY Dictionary, The. Vol. IV. M-P. New York, The Century Co. 1324 p. 1°. \$10.
- COLLEGE Advance, The. Vol. i. No. 1. Winfield, Kan., E. H. Vaughan. 4 p. 1°. 25 cents per year.
- EDDY, H. T. Maximum Stresses under Concentrated Loads. New York, Van Nostrand. 100 p. 8°.
- GILMAN, N. P. Industrial Partnership or Profit Sharing. Boston, G. H. Ellis. 18 p. 24°.
- HARVARD COLLEGE, Annals of the Astronomical Observatory of. Vol. XXI. Part II. Investigations of the New England Meteorological Society in the Year 1889. Cambridge, W. H. Wheeler, Pr. 273 p. 4°.
- Same. Vol. XXX. Part I. Observations made at the Blue Hill Meteorological Observatory, Massachusetts, in the Year 1889. Cambridge, John Wilson & Son, Pr. 75 p. 4°.
- HUDSON, H. N. The Ancient Mariner. Boston, Ginn. 21 p. 12°.
- LANGE, Helene. Higher Education of Women in Europe. Tr. by L. R. Klemm, Ph.D. (International Education. Series.) New York, Appleton. 186 p. 12°. \$1.25.
- MACAULAY'S Second Essay on the Earl of Chatham. With Notes and a Sketch of Macaulay's Life by D. H. M. Boston, Ginn. 91 p. 12°.
- McMILLAN, W. G. A Treatise on Electro-Metallurgy. London, Charles Griffin & Co.; Philadelphia, Lippincott. 387 p. 12°. \$3.50.
- MACOUN, J. Catalogue of Canadian Plants. Part V. Acrogens. Montreal, W. Foster Brown & Co. 428 p. 8°.
- MODIGLIANI, E. Un Viaggio a Nias. Milan, Fratelli Treves. 726 p. 8°.
- NICOLSON, F. W. P. Terenti Afri. Phormio. Boston, Ginn. 66 p. 12°. 30 cents.
- PEARSON, W. H. List of Canadian Hepaticæ. Montreal, W. Foster Brown & Co. 31 p. 8°.
- PICKERING, E. C., and WENDELL, O. C. Results of Observations with the Meridian Photometer during the Years 1882-88. (Annals of the Astronomical Observatory of Harvard College. Vol. XXIV.) Cambridge, John Wilson & Son, Pr. 267 p. 4°.
- ROLFE, J. C. P. Terenti Afri. Heavton Timorv-menos. Boston, Ginn. 61 p. 12°. 30 cents.

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their product is as powerful as dynamite. The principal difficulty in arranging the experiments was to decide in what way the strength of the explosives should be tested, as no method yet invented can be considered entirely satisfactory. Finally Lieut. Walke decided to use the Quinan pressure gauge. The instrument used consisted of a heavy block of wood upon which was bolted a cast-iron block. In this block four wrought-iron guides were twisted around the circumference of a circle four inches in diameter, and were connected by a ring at their outer ends. A steel plate was let into the block, and was flush with its upper surface. The piston, which rested on a plug of lead, was of tempered steel four inches in diameter and five inches long, and moved freely between the guides. It weighed twelve pounds and a quarter. On the top of this piston was a parabolic cavity to hold the charge of explosive. The shot, made of tempered steel, was four inches in diameter and ten inches long, weighing four pounds and a half. It was bored down its centre to receive a capped fuze. To operate the instrument, a plug or cylinder of lead was placed on the steel plate, and the piston lowered gently down on it. The charge of explosive being placed in the cavity, the shot was gently lowered upon the piston. On firing the charge, the shot is thrown out and the piston forced down on the lead plug, which it compresses, the amount of compression being a measure of the strength of the explosive. Twenty-seven explosives in all being tried, the results were compared with those obtained with a sample of nitroglycerine, the strength of which was reckoned as 100. The results placed explosive gelatine and hellhoffite first with a strength of 106.17; gun-cotton and dynamite had each a strength of over 80; emmensite, a new American explosive, one of nearly 78; bellite, one of 65.70; and melenite, the famous French explosive,

which is not nearly so safe to handle as bellite, had a strength of only 50.82. The above figures are of course not absolute, but they, at any rate, show the order in which the various explosives come.

INDUSTRIAL NOTES.

A Model Electric-Light Plant.

IN April of last year the electric-light system of the Eureka Electric Light Company of this city, then known as the Loomis system, was illustrated and described in these columns. Since that time the progress of the Eureka Company has been steady, though not as rapid, perhaps, as that of its older and larger competitors. Lighting and power plants have been installed in many parts of the country, and many improvements, both mechanical and electrical, have been made in minor details of the apparatus.

One of the latest of the Eureka Company's installations is a five-hundred light plant in the Vanderbilt Building, a large office building on Nassau Street, this city. The dynamo, of five-hundred-light capacity, is driven by a fifty-horse-power Fitchburg engine the Evans friction cone (also described in these columns some time ago) being used instead of belting, to transmit the power from engine to dynamo. This friction cone admits of a very compact arrangement of machinery, much less floor-space being required, as the engine and dynamo stand close together. This is an important consideration in modern office buildings, especially where space is valuable. The installation as a whole is one of the simpler and yet most complete, both electrically and mechanically, to be found in this city.

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Dec. 6.—E. G. Fischer, On Standard Screws and Threads; Gilbert Thompson, An Example of Work in Barometric Hypsometry; B. E. Fernow, On the Artificial Production of Rainfall.

Appalachian Mountain Club, Boston.

Dec. 10.—Miss M. A. J. Frothingham, From the Gemmi to the Breithorn; H. H. Campbell, A Trip to the "Seven Ponds" in Maine (read by Mr. A. E. Scott).

Dec. 18 (special meeting).—Charles G. Van Brunt, An Ascent of Sierra Blanca, Col.

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